# Sampling QA/QC Work Plan

## Richardson Flat Tailings

Prepared by
Ecology & Environment, Inc.

EPA Project No.: T08-9210-041
Contractor Work Order No.: EUT0039SCA
EPA Contract No.: 68-WO-0037

Approvals

| Ecology & Environment, Inc. | | EPA | |
|---|---|---|---|
| _____ | _____ | Mike Zimmerman | 10/29/92 |
| Scott Keen<br>Project Manager | Date | Mike Zimmerman<br>On-Scene Coordinator | Date |

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## 1.0 BACKGROUND

The suspected contamination at the Richardson Flat Tailings site (the Site) is a result of:

air migration of metals from tailings area; groundwater to surface water migration of contaminants from both the tailings and the landfill areas; and potential direct leaching from tailings or landfill to surface water.

The following information is known about the Site:

The Site is located 3.5 miles northeast of Park City, Summit County, Utah. From 1975 to 1981 the 160 acre site was used for placement of mine tailings from mines owned by United Park City Mines (UPCM). Tailings were placed at depths of up to ten feet. In 1983 UPCM began to use soil to cover the tailings. This is an on-going project which was eighty-five percent complete by UPCM estimates during the time of a site visit in April 1992. A security fence has been put in place surrounding the Site. Also on the Site is a municipal/sanitary landfill. This land was leased by UPCM to the city of Park City and was used for landfill purposes in the mid-1970s. In 1990 a highway was placed through the middle of the landfill creating two sections (one section of the landfill on each side of the highway). Refuse in the path of the highway was removed and placed on top of the undisturbed landfill sections and covered with soil.

The Site lies in a rural area with very widely scattered residences. It is within 1.5 miles of Prospector Square, a new residential community that supports Park City. Only three residences are within a one mile radius of the site.

The types of material(s) handled by this facility have been:

Mine Tailings
Municipal/Sanitary Refuse

The volume(s) of contaminated materials to be addressed are:

2 million tons - mine tailings
Unknown quantity - municipal/sanitary refuse

The contaminants of concern are:

Metals from the mine tailings
Metals, volatile organics, BNA's, and pesticides from the landfill.

The basis of this information may be found in:

Previous studies.

## 2.0 DATA USE OBJECTIVES

The objective of this project/sampling event is to determine:

Immediate threats to human health and/or the environment.

For the purpose of:

Assuring site safety preceding remedial activities.

The data gathered by this sampling event will be evaluated against:

State groundwater standards and quality criteria and background concentrations with the intent of establishing whether an immediate threat to human health or the environment exists and of defining appropriate cleanup levels, if necessary.

## 3.0 Quality Assurance Objectives

As identified in Sections 1.0 and 2.0 the objective of this project/event applies to the following parameters:

| Parameters | Matrix | Intended Use Of Data | QA Objective |
|---|---|---|---|
| BNA, VOC, Pesticides, Metals | Groundwater | Determine Threat | QA-2 |

Note: The QA-2 level of quality assurance will meet the Level IV analytical objectives for remedial response activities as defined in OSWER Directive 9355.0-7B. For each sample matrix the CLP lab will be asked to perform a matrix spike/matrix spike duplicate analysis.

## 4.0 Approach And Sampling Methodologies

### 4.1 Sampling Equipment

The following equipment will be utilized to obtain environmental samples from the respective media/matrix:

| Parameter/Matrix | Sampling Equipment | Fabrication | Dedicated |
|---|---|---|---|
| BNA in Groundwater | Bailer | Teflon (PTFE) | Yes |

| Parameter/Matrix | Sampling Equipment | Fabrication | Dedicated |
|---|---|---|---|
| Inorganics in Groundwater | Bailer | Teflon (PTFE) | Yes |

| Parameter/Matrix | Sampling Equipment | Fabrication | Dedicated |
|---|---|---|---|
| Pesticide in Groundwater | Bailer | Teflon (PTFE) | Yes |

| Parameter/Matrix | Sampling Equipment | Fabrication | Dedicated |
|---|---|---|---|
| VOC in Groundwater | Bailer | Teflon (PTFE) | Yes |

### 4.2 Sampling Design

The sampling design is depicted on the attached Sample Location Map (Figure 2).

Landfill Assessment. One upgradient and two downgradient monitoring wells will sampled to determine releases to groundwater from the municipal/sanitary landfill. Samples will be analyzed for base/neutral extractable compounds (BNAs), volatile organic compounds (VOCs), pesticides, and inorganics. Both unfiltered and filtered samples will be collected for inorganic/metals analyses.

The three monitoring wells to be sampled are designated RF-GW-01, RF-GW-02, and RF-GW-03. From each location an unfiltered and a filtered sample will be taken. The filtered sample will be submitted for metals analysis. The unfiltered sample will be analyzed for BNAs, VOCs, Pesticides/PCBs, and metals. One of the sample aliquots (filtered or unfiltered) for metals analysis will be collected in double volume. At one of the three locations triple volume sample will be collected for organics (BNAs, VOCs, Pesticides/PCBs) analyses. A trip blank will also be

## 4.3 Standard Operating Procedures

### 4.3.1 Sample Documentation

All sample documents must be completed legibly, in ink. Any corrections or revisions must be made by lining through the incorrect entry and by initiating the error.

FIELD LOG BOOK

The Field Log Book is essentially a descriptive notebook detailing Site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. All entries should be dated and signed by the individuals making the entries, and should include (at a minimum) the following:

1. Site name and project number.
2. Name(s) of personnel on-site.
3. Dates and times of all entries (military time preferred).
4. Descriptions of all site activities, including site entry and exit times.
5. Noteworthy events and discussions.
6. Weather conditions.
7. Site observations.
8. Identification and description of samples and locations.
9. Subcontractor information and names of on-site personnel.
10. Date and time of sample collections, along with chain-of-custody information.
11. Record of photographs.
12. Site sketches.

SAMPLE LABELS

Sample labels must clearly identify the particular sample, and should include the following:

1. Site name and number.
2. Time sample was taken.
3. Sample preservation.
4. Initial of sampler(s).

Optional, but pertinent, information:

1. Analysis requested.
2. Sample location.

Sample labels must be securely affixed to the sample container. Tie-on labels can be used if properly secured.

CHAIN-OF-CUSTODY RECORD

A Chain-of-Custody record must be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a Chain-of-Custody seal.

The Chain-of-Custody record should include (at minimum) the following:

1. Sample identification number.
2. Sample information.
3. Sample location.
4. Sample date.
5. Name(s) and signature(s) of sampler(s).
6. Signature(s) of any individual(s) with control over samples.

CHAIN-OF-CUSTODY SEALS

Chain-of-Custody Seals demonstrate that a sample container has not been tampered with, or opened.

The individual in possession of the sample(s) must sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, must be noted in the Field Logbook.

4.3.2 Sampling SOPs

Sampling SOPs from the USEPA Emergency Response Branch Region VIII Quality Assurance Project Plan will be followed. Sample "splits" for all samples will be available to UPCM and to the State of Utah upon request.

GROUNDWATER WELL SAMPLING

Prir to sampling a well, the well will be purged. For this project, this will be accomplished with a bailer. Purge water will be placed back in the well or will be poured on the ground near the well from which it came, following sampling.

Brush off well cap prior to opening, unlock and open well cap. A photoionization detector (HNU) or flame ionization detector (OVA) will be used on the escaping gases to determine the need for respiratory protection. Using a decontaminated water level indicator, the water level will be measured. Total depth of the well will be obtained with a depth sounder and the volume of water in the well will be calculated.

Three well volumes at a minimum should be purged if possible. Equipment must be decontaminated prior to use and between wells if dedicated equipment is not used.

Once purging is completed and the correct laboratory-cleaned sample jars and/or vials have been prepared, sampling will proceed. The sampling device (which may or may not be the same as the purging device) has been selected so as to not affect the integrity of the sample. Sampling will occur in a progression from the least to most contaminated well, if known.

The water sample will be collected using a teflon or stainless steel bailer. The bailer will be attached to a clean, dedicated, nylon rope and introduced into the well. The bailer will be lowered to the approximate mid-point of the screened interval. Once the sample is collected, care will be taken not to unduly agitate or aerate the water while pouring into the appropriate sample containers.

Measure the conductivity, temperature, and pH of the groundwater in a separate container. Record all field measurements on the field data sheets and in the field notebook.

4.3.3 Sample Handling and Shipment

Each of the sample bottles will be sealed and labeled according to the following protocol. Caps will be secured with custody seals. Bottle labels will contain all required information including sample number, time and date of collection, analysis requested, and preservative used. Sealed bottles will be placed in large metal or plastic coolers, and padded with an absorbent material such as vermiculite.

All sample documents will be affixed to the underside of each cooler lid. The lid will be sealed and affixed on

at least two sides with EPA custody seals so that any sign of tampering is easily visible.

4.3.4 Decontamination Procedures

Decontamination procedures will also follow those described in the USEPA Region VIII Emergence Response Branch Quality Assurance Project Plan.

Groundwater Sampling. Bailers will be dedicated Teflon equipment. New braided nylon cord will be used at each monitoring well for bailing. Samples will be taken directly from bailers, thus decontamination steps will not be required.

4.4 Schedule of Activities

Table 1: Proposed Schedule of Work

| Activity | Start Date | End Date |
|---|---|---|
| Groundwater Sampling | 11/9/92 | 11/11/92 |
| Sample Shipment | 11/11/92 | 11/11/92 |

5.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The EPA On-Scene Coordinator, Mike Zimmerman, will provide overall direction to Ecology & Environment, Inc. staff concerning project sampling needs, objectives and schedule. Ecology & Environment, Inc. is under contract to provide technical assistance to the Emergency Response Branch of the U.S. EPA in Region VIII.

The Ecology & Environment, Inc. Project Manager, Scott Keen, is the primary point of contact with the EPA On-Scene Coordinator. The Project Manager is responsible for the development and completion of the Sampling QA/QC Plan, project team organization, and supervision of all project tasks, including reporting and deliverables. The Project Manager and the Field Manager are responsible for ensuring field adherence to the Sampling QA/QC Plan and recording any deviations. The Site QC Coordinator is also the primary project team contact with the lab.

The following personnel will work on this project:

| Personnel | Responsibility |
|---|---|
| Scott Keen | Project Manager |
| Cordell Schmidt | Field Manager |
| Jeff Fleming | H & S Officer, Sampler |
| Troy Sanders | Sampler |

The following laboratories will be providing the following analyses:

| Lab Name / Location | Lab Type | Parameters |
|---|---|---|
| Unknown | CLP | BNAs, VOCs, Pesticides |
| Unknown | CLP | Metals |

## 6.0 QUALITY ASSURANCE REQUIREMENTS

The following requirements apply to the respective QA Objectives and parameters identified in Section 3.0:

The following QA Protocols for QA-2 data are applicable to all sample matrices and include:

1. Provide sample documentation in the form of field logbooks, the appropriate field data sheets and chain of custody forms. Chain of custody sheets are optional for field screening locations.

2. All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument log notebook.

3. The detection limit will be determined and recorded, along with the data, where appropriate.

4. Document sample holding times; this includes documentation of sample collection and analysis dates.

5. Provide initial and continuing instrument calibration data.

6a. For soil, sediment and water samples, include rinsate blanks and

trip blanks.

6b. For air samples, include lot blanks, field blanks, co-located samples, blind spikes, breakthrough, and surrogate/matrix spikes.

7. Performance Evaluation samples are optional, if available.

8. One of the following three options will be selected:

1. Definitive identification (choose one):

a. Screened data - confirm the identification of analytes via an EPA-approved method different from the screening method (field or lab) on at least 10% of the preliminary screened samples collected; provide documentation such as gas chromatograms, mass spectra, etc.
b. Unscreened data - confirm the identification of analytes via an EPA-approved method on all unscreened environmental samples; provide documentation such as gas chromatograms, mass spectra, etc.

2. Non-definitive quantitation (choose one):

a. Screened data - provide documentation of quantitative results from both the screening method and the EPA verification method.

b. Unscreened data - provide documentation of quantitative results.

3. Definitive quantitation/analytical error (choose one):

a. Screened data - determine the analytical error by calculating the precision, accuracy, and coefficient of variation by preparing and analyzing eight (8) QA replicates from the subset of samples used to verify screening results using an EPA-approved method.

b. Unscreened data - determine the analytical effort by calculating the precision, accuracy, and coefficient of variation by preparing and analyzing eight (8) samples analyzed using an EPA-approved method.

## 7.0 DELIVERABLES

The Ecology & Environment, Inc. Task Leader, Scott Keen, will maintain contact with the EPA On-Scene Coordinator, Mike Zimmerman, to keep him informed about the technical and financial progress of this project. This communication will commence with the issuance of the work assignment and project scoping meeting. Activities under this project will be reported in status and trip reports and other deliverables (e.g., analytical reports, final reports) described herein. Activities will

also be summarized in appropriate format for inclusion in monthly and annual reports.

Analytical Report

An analytical report will be prepared for samples analyzed under this plan. Information regarding the analytical methods/procedures employed, sample results, QA/QC results,chain-of-custody documentation, laboratory correspondence,and raw data will be provided within this deliverable.

Final Report

A final report will be prepared to correlate available background information with data generated under this sampling event and identify supportable conclusions and recommendations which satisfy the objectives of this sampling QA/QC plan.

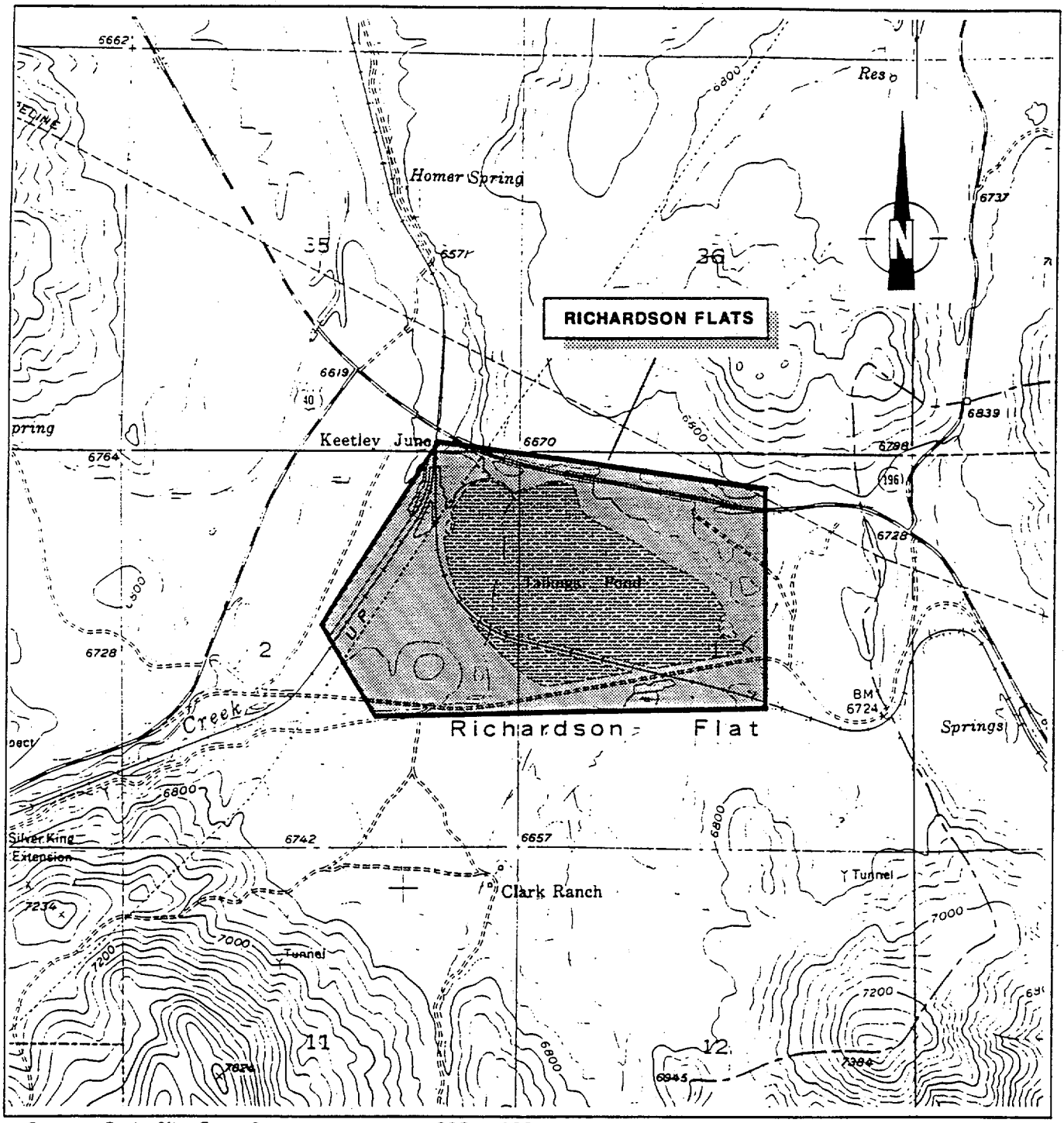
## 8.0 DATA VALIDATION

QA 2

Data generated under this QA/QC Sampling Plan will be evaluated accordingly with appropriate criteria contained in the Removal Program Data Validation Procedures which accompany OSWER Directive #9360.4-1.

Specific data review activities for QA 2 should be performed by the following approach:

1. Of the samples collected in the field, 10% will be confirmed for identification, precision, accuracy, and error determination.
2. The results of 10% of the samples in the analytical data packages should be evaluated for holding times, blank contamination, spike (surrogate/matrix) recovery, and detection capability.
3. The holding times, blank contamination, and detection capability will be reviewed for the remaining samples.




Source: Park City East Quadrangle, Utah. USGS, 1955

0 1/2 1 MILE

1000 0 1000 2000 3000 4000 5000

LOCATION MAP


LEGEND

Site location

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY RESPONSE, REMOVAL AND PREVENTION
EPA CONTRACT 68-WO-0037

TITLE:

RICHARDSON FLATS
Park City, Utah
SITE LOCATION MAP

T.D.D. T08-9204-015

ecology & environment, inc.
DENVER, COLORADO

FIG. 1

Date: 05/92 Drawn by: RSM Scale:

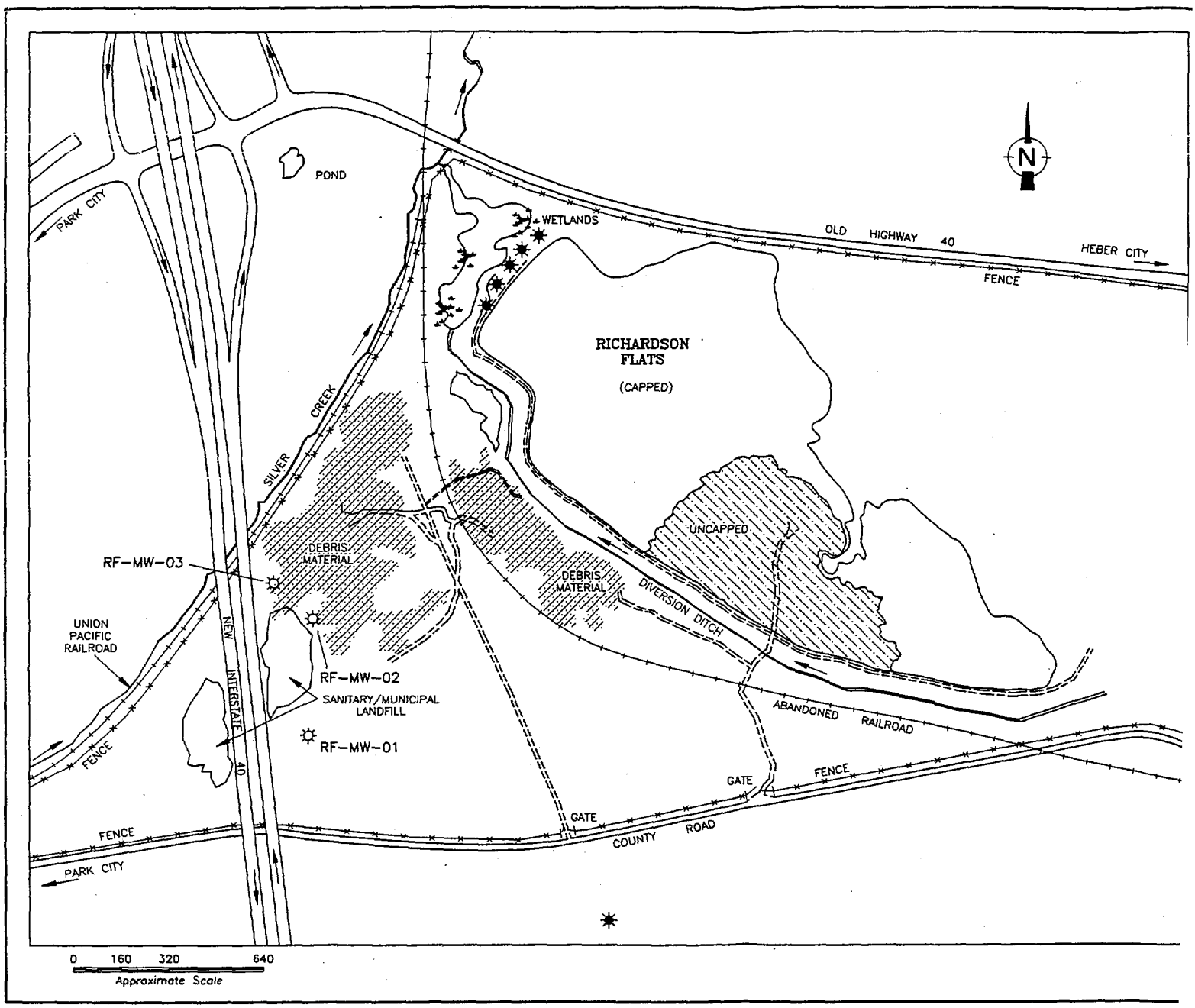

N
POND
PARK CITY
WETLANDS
OLD HIGHWAY 40
HEBER CITY
FENCE
RICHARDSON FLATS
(CAPPED)
SILVER CREEK
UNCAPPED
DEBRIS MATERIAL
DEBRIS MATERIAL
DIVERSION DITCH
RF-MW-03
UNION PACIFIC RAILROAD
NEW INTERSTATE 40
RF-MW-02
SANITARY/MUNICIPAL LANDFILL
RF-MW-01
ABANDONED RAILROAD
FENCE
GATE
FENCE
GATE
FENCE
COUNTY ROAD
PARK CITY
0 160 320 640
Approximate Scale

FIGURE 3

TARGET COMPOUND LIST (TCL) AND

CONTRACT REQUIRED QUANTITATION LIMITS (CROL)*

| Volatiles | | CAS Number | Quantitation Limits** Water Low ug/L | Soil/Sediment a ug/Kg |
|---|---|---|---|---|
| 1. | Chloromethane | 74-87-3 | 10 | 10 |
| 2. | Bromomethane | 74-83-9 | 10 | 10 |
| 3. | Vinyl Chloride | 75-01-4 | 10 | 10 |
| 4. | Chloroethane | 75-00-3 | 10 | 10 |
| 5. | Methylene Chloride | 75-09-2 | 5 | 5 |
| 6. | Acetone | 67-64-1 | 10 | 10 |
| 7. | Carbon Disulfide | 75-15-0 | 5 | 5 |
| 8. | 1,1-Dichloroethane | 75-35-4 | 5 | 5 |
| 9. | 1,1-Dichloroethane | 75-34-3 | 5 | 5 |
| 10. | 1,2-Dichloroethane (total) | 540-59-0 | 5 | 5 |
| 11. | Chloroform | 67-66-3 | 5 | 5 |
| 12. | 1,2-Dichloroethane | 107-06-2 | 5 | 5 |
| 13. | 2-Butanone | 78-93-3 | 10 | 10 |
| 14. | 1,1,1-Trichloroethane | 71-55-6 | 5 | 5 |
| 15. | Carbon Tetrachloride | 56-23-5 | 5 | 5 |
| 16. | Vinyl Acetate | 108-05-4 | 10 | 10 |
| 17. | Bromodichloromethane | 75-27-4 | 5 | 5 |
| 18. | 1,2-Dichloropropene | 78-87-5 | 5 | 5 |
| 19. | cis-1,3-Dichloropropene | 10061-01-5 | 5 | 5 |
| 20. | Trichloroethene | 79-01-6 | 5 | 5 |
| 21. | Dibromochloromethane | 124-48-1 | 5 | 5 |
| 22. | 1,1,2-Trichloroethane | 79-00-5 | 5 | 5 |
| 23. | Benzene | 71-43-2 | 5 | 5 |
| 24. | trans-1,3-Dichloropropene | 10061-02-6 | 5 | 5 |
| 25. | Bromoform | 75-25-2 | 5 | 5 |
| 26. | 4-Methyl-2-pentanone | 108-10-1 | 10 | 10 |
| 27. | 2-Hexanone | 591-78-6 | 10 | 10 |
| 28. | Tetrachloroethane | 127-18-4 | 5 | 5 |
| 29. | Toluene | 108-88-3 | 5 | 5 |
| 30. | 1,1,2,2-Tetrachloroethane | 79-34-5 | 5 | 5 |
| 31. | Chlorobenzene | 108-90-7 | 5 | 5 |
| 32. | Ethyl Benzene | 100-41-4 | 5 | 5 |
| 33. | Styrene | 100-42-5 | 5 | 5 |
| 34. | Xylenes (total) | 1330-20-7 | 5 | 5 |

a Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and

may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

| Semivolatiles | | CAS Number | Quantitation Limits** Water Low ug/L | Soil/Sediment ug/Kg |
|---|---|---|---|---|
| 35. | Phenol | 108-95-2 | 10 | 330 |
| 36. | bis (2-Chloroethyl) ether | 111-44-4 | 10 | 330 |
| 37. | 2-Chlorophenol | 95-57-8 | 10 | 330 |
| 38. | 1,3-Dichlorobenzene | 541-73-1 | 10 | 330 |
| 39. | 1,4-Dichlorobenzene | 106-46-7 | 10 | 330 |
| 40. | Benzyl alcohol | 100-51-6 | 10 | 330 |
| 41. | 1,2-Dichlorobenzene | 95-50-1 | 10 | 330 |
| 42. | 2-Methylphenol | 95-48-7 | 10 | 330 |
| 43. | bis (2-Chloroisopropyl) ether | 108-60-1 | 10 | 330 |
| 44. | 4-Methylphenol | 106-44-5 | 10 | 330 |
| 45. | N-Nitroso-di-n-dipropylamine | 621-64-7 | 10 | 330 |
| 46. | Hexachloroethane | 67-72-1 | 10 | 330 |
| 47. | Nitrobenzene | 98-95-3 | 10 | 330 |
| 48. | Isophorone | 78-59-1 | 10 | 330 |
| 49. | 2-Nitrophenol | 88-75-5 | 10 | 330 |
| 50. | 2,4-Dimethylphenol | 105-67-9 | 10 | 330 |
| 51. | Benzoic acid | 65-85-0 | 50 | 1600 |
| 52. | bis (2-Chloroethoxy) methane | 111-91-1 | 10 | 330 |
| 53. | 2,4-Dichlorophenol | 120-83-2 | 10 | 330 |
| 54. | 1,2,4-Trichlorobenzene | 120-82-1 | 10 | 330 |
| 55. | Naphthalene | 91-20-3 | 10 | 330 |
| 56. | 4-Chloroaniline | 106-47-8 | 10 | 330 |
| 57. | Hexachlorobutadiene | 87-68-3 | 10 | 330 |
| 58. | 4-Chloro-3-methylphenol (para-chloro-meta-cresol) | 59-50-7 | 10 | 330 |
| 59. | 2-Methylnaphthalene | 91-57-6 | 10 | 330 |
| 60. | Hexachlorocyclopentadiene | 77-47-4 | 10 | 330 |
| 61. | 2,4,6-Trichlorophenol | 88-06-2 | 10 | 330 |
| 62. | 2,4,5-Trichlorophenol | 95-95-4 | 50 | 1600 |
| 63. | 2-Chloronaphthalene | 91-58-7 | 10 | 330 |
| 64. | 2-Nitroaniline | 88-74-4 | 50 | 1600 |
| 65. | Dimethylphthalate | 131-11-3 | 10 | 330 |
| 66. | Acenaphthylene | 208-96-8 | 10 | 330 |
| 67. | 2,6-Dinitrotoluene | 606-20-2 | 10 | 330 |
| 68. | 3-Nitroaniline | 99-09-2 | 50 | 1600 |
| 69. | Acenaphthene | 83-32-9 | 10 | 330 |

| | | | | |
|---|---|---|---|---|
| 70. | 2,4-Dinitrophenol | 51-28-5 | 50 | 1600 |
| 71. | 4-Nitrophenol | 100-02-7 | 50 | 1600 |
| 72. | Dibenzofuran | 132-64-9 | 10 | 330 |
| 73. | 2,4-Dinitroroluene | 121-14-2 | 10 | 330 |
| 74. | Diethylphthalate | 84-66-2 | 10 | 330 |
| 75. | 4-Chlorophenyl-phenyl ether | 7005-72-3 | 10 | 330 |
| 76. | Fluorene | 86-73-7 | 10 | 330 |
| 77. | 4-Nitroaniline | 100-01-6 | 50 | 1600 |
| 78. | 4,6-Dinitro-2-methylphenol | 534-52-1 | 50 | 1600 |
| 79. | N-nitrosodiphenylamine | 86-30-6 | 10 | 330 |
| 80. | 4-Bromophenyl-phenyl ether | 101-55-3 | 10 | 330 |
| 81. | Hexachlorobenzene | 118-74-1 | 10 | 330 |
| 82. | Pentachlorophenol | 87-86-5 | 50 | 1600 |
| 83. | Phenanthrene | 85-01-8 | 10 | 330 |
| 84. | Anthracene | 120-12-7 | 10 | 330 |
| 85. | Di-n-butylphthalate | 84-74-2 | 10 | 330 |
| 86. | Fluoranthene | 206-44-0 | 10 | 330 |
| 87. | Pyrene | 129-00-0 | 10 | 330 |
| 88. | Butylbenzylphthalate | 85-68-7 | 10 | 330 |
| 89. | 3,3-Dichlorobenzidine | 91-94-1 | 20 | 660 |
| 90. | Benzo (a) anthracene | 56-55-3 | 10 | 330 |
| 91. | Chrysene | 218-01-9 | 10 | 330 |
| 92. | bis (2-Ethylhexyl) phthalate | 117-81-7 | 10 | 330 |
| 93. | Di-n-octylphthalate | 117-84-0 | 10 | 330 |
| 94. | Benzo (b) fluoranthene | 205-99-2 | 10 | 330 |
| 95. | Benzo (k) fluoranthene | 207-08-9 | 10 | 330 |
| 96. | Benzo (a) pyrene | 50-32-8 | 10 | 330 |
| 97. | Indeno (1,2,3-cd) pyrene | 193-39-5 | 10 | 330 |
| 98. | Dibenz (a,h) anthracene | 53-70-3 | 10 | 330 |
| 99. | Benzo (g,h,i) perylene | 191-24-2 | 10 | 330 |

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b Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

| Pesticides/PCBs | | CAS Number | Quantitation Limits** Water ug/L | Low Soil/Sediment ug/Kg |
|---|---|---|---|---|
| 100. | alpha-BHC | 319-84-6 | 0.05 | 8.0 |
| 101. | beta-BHC | 319-85-7 | 0.05 | 8.0 |
| 102. | delta-BHC | 319-86-8 | 0.05 | 8.0 |
| 103. | gamma-BHC (Lindane) | 58-89-9 | 0.05 | 8.0 |
| 104. | Heptaclor | 76-44-8 | 0.05 | 8.0 |
| 105. | Aldrin | 309-00-2 | 0.05 | 8.0 |
| 106. | Heptachlor epoxide | 1024-57-3 | 0.05 | 8.0 |
| 107. | Endosulfan I | 959-98-8 | 0.05 | 8.0 |
| 108. | Dieldrin | 60-57-1 | 0.10 | 16.0 |
| 109. | 4,4'-DDE | 72-55-9 | 0.10 | 16.0 |
| 110. | Endrin | 72-20-8 | 0.10 | 16.0 |
| 111. | Endosulfan II | 33213-65-9 | 0.10 | 16.0 |
| 112. | 4,4'-DDD | 72-54-8 | 0.10 | 16.0 |
| 113. | Endosulfan sulfate | 1031-07-8 | 0.10 | 16.0 |
| 114. | 4,4'-DDT | 50-29-3 | 0.10 | 16.0 |
| 115. | Methoxychlor | 72-43-5 | 0.5 | 80.0 |
| 116. | Endrin ketone | 53494-70-5 | 0.10 | 16.0 |
| 117. | alpha-Chlordane | 5103-71-9 | 0.5 | 80.0 |
| 118. | gamma-Chlordane | 5103-74-2 | 0.5 | 80.0 |
| 119. | Toxaphene | 8001-35-2 | 1.0 | 160.0 |
| 120. | Aroclor-1016 | 12674-11-2 | 0.5 | 80.0 |
| 121. | Aroclor-1221 | 11104-28-2 | 0.5 | 80.0 |
| 122. | Aroclor-1232 | 11141-16-5 | 0.5 | 80.0 |
| 123. | Aroclor-1242 | 53469-29-6 | 0.5 | 80.0 |
| 124. | Aroclor-1248 | 12672-29-6 | 0.5 | 80.0 |
| 125. | Aroclor-1254 | 11097-69-1 | 1.0 | 160.0 |
| 126. | Aroclor-1260 | 11096-82-5 | 1.0 | 160.0 |

c Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticides/PCB TCL compounds are 15 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The

quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

INORGANIC TARGET ANALYTE LIST (TAL)

| Analyte | Contract Required Detection Limit 1,2 (ug/L -- water*) |
|---|---|
| Aluminum | 200 |
| Antimony | 60 |
| Arsenic | 10 |
| Barium | 200 |

## SAMPLE BOTTLE REQUIREMENTS

### ORGANICS

| Analysis | Soil/Solids | Water | Preservation |
|---|---|---|---|
| Volatiles (VOA) | 2x40ml glass | 2x40ml glass | Ice |
| Semi-volatiles (BNA) | 1x8oz glass | 1x80oz amber glass | Ice |
| Pesticides/PCBs | 1x8oz glass | 1x80oz amber glass | Ice |
| Organophosphate Pest. | 1x8oz glass | 1x80oz amber glass | Ice |
| Chlorinated Herbicides | 1x8oz glass | 1x80oz amber glass | Ice |
| Dioxin | 1x8oz glass | | None |
| High Concentration | 1x8oz glass | 2x40ml glass | None |

**Note: For QA Level 2, a matrix spike and matrix spike duplicate should be collected. Also one <u>water</u> VOA sample should be carried as a trip blank.**

### INORGANICS

| Analysis | Soil/Solids | Water | Preservation |
|---|---|---|---|
| Metals | 1x8oz glass | 1x1L poly (Nitric Acid pH<2) | Ice |
| Cyanide | 1x8oz glass | 1x1L poly (NaOH pH>12) | Ice |

### RADIOCHEMISTRY

| Analysis | Soil/Solids | Water | Preservation |
|---|---|---|---|
| Radioisotopes | 1x8oz glass | 1x1 Gallon glass/poly | None |
| Total Uranium | 1x8oz glass | 1x1 Gallon glass/poly | None |
| Gross Alpha/Beta | | 1x1 Gallon glass/poly | None |

### TCLP

| Analysis | Soil/Solids | Water | Preservation |
|---|---|---|---|
| Full TCLP | 4x8oz glass | 1x1L poly+2x80oz glass | Ice |
| Metals | 1x8oz glass | 1x1L poly | None |
| Volatile (VOA) | 2x40ml glass | 4x40ml glass | Ice |
| Semi-volatile (BNA) | 1x8oz glass | 1x80oz amber glass | Ice |
| Pesticides/Herbicides | 1x8oz glass | 1x80oz amber glass | Ice |

| Analysis | TCLP Sludge(<.5% solids) | Solvent/Oil | Preservation |
|---|---|---|---|
| Full TCLP | 2x80oz glass+1L poly | 3x80oz glass | Ice |
| Metals | 1x1L poly | 2x80oz amber glass | None |
| Volatile (VOA) | 4x40ml glass | 0.5L amber glass | Ice |
| Semi-volatile (BNA) | 1x80oz amber glass | 1x80oz amber glass | Ice |
| Pesticides/Herbicides | 1x80oz amber glass | 1x80oz amber glass | Ice |

**Note: DO NOT ADD ANY ACID PRESERVATIVES TO ANY TCLP SAMPLE!!!**
**DO NOT TAKE LIQUID SAMPLES IN 4oz OR 8oz GLASS JARS, THEY LEAK!!!**

## APPROXIMATE SAMPLE WEIGHTS FOR SHIPPING

1x40ml water is 0.04 KG
1x40ml soil is 0.1 KG
1x8oz soil is 0.6 KG
1x80oz water is 2.4 KG
1x1L water is 1.0 KG
1x0.5L water is 0.5 KG